Knowledge, awareness, attitudes and screening practices towards breast and cervical cancer among women in Nepal: a scoping review

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REVIEW ARTICLE

Knowledge, awareness, attitudes and screening practices towards breast and cervical cancer among women in Nepal: a scoping review

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Abstract

Aim Breast and cervical cancers have emerged as major global health challenges and disproportionately affect women in low- and middle-income countries, including Nepal. This scoping review aimed to map the knowledge, attitudes and screening practices for these cancers among Nepali women to improve cancer outcomes and reduce inequality.

Methods Five electronic databases (CINAHL, Embase, Global Health, PsycINFO and PubMed), grey literature, and reference and citation lists were searched for articles published in English up to June 2021. Articles were screened against inclusion/exclusion criteria, and data from eligible studies were extracted. Results were summarised narratively.

Results The search yielded 615 articles, 38 of which were included in this scoping review (27 cervical cancer, 10 breast cancer, 1 both cancers). Levels of knowledge regarding breast and cervical varied widely. The main knowledge gaps were misconceptions about symptoms and risk factors, and poor understanding of screening behaviours. Screening practices were mostly inadequate due to socio-cultural, geographical or financial barriers. Positive attitudes towards cervical screening were associated with higher education and increased knowledge of screening modalities. Higher levels of knowledge, (health) literacy and participation in awareness campaigns facilitated breast cancer screening.

Conclusion Knowledge and screening practices for breast and cervical cancer among Nepali women were poor and highlight the need for awareness and education programmes. Future research should explore community health worker-led awareness and screening interventions for cervical cancer, and programmes to increase the practice of breast self-examination and clinical breast examinations to support early diagnosis of breast cancer.

Keywords Breast cancer · Cervical cancer · Knowledge · Attitudes · Screening practices · Nepal

Introduction

Cancer is a growing global concern. According to the estimates published by GLOBOCAN, there were 19 million new cancer cases and almost 10 million cancer deaths worldwide in 2020 (Sung et al. 2021). The number of new cases is projected to rise by 47% to over 28 million in 2040, with the greatest increases expected in low- and middle-income countries (LMICs) (Sung et al. 2021). This is attributed to population growth and increased exposure to risk factors such as smoking, dietary changes and physical inactivity. It is in keeping with the epidemiological transition which causes a shift in the disease burden from predominantly infectious diseases to non-communicable diseases (NCDs), including cancer (Rai 2018; Remais et al. 2013; Sung et al. 2021). Women in LMICs are disproportionately affected by cancer, and have a higher disease burden due to vulnerabilities related to gender inequality, poverty and environmental factors (Ginsburg et al. 2017). Breast cancer (BC) is the most commonly diagnosed cancer and cervical cancer (CC) the fourth most common cancer in women worldwide (Sung et al. 2021). Both cancers have emerged as two major health challenges for women in LMICs, as mortality rates

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are substantially higher for both cancers compared to rates in high-income countries (HICs) (Bray et al. 2012; Heer et al. 2020; Sung et al. 2021; Torre et al. 2017).

Many LMICs have inadequate capacity to provide accessible breast and cervical cancer screening and cancer care, including Nepal. Nepal is among the least developed countries in the world. Around 25% of its estimated population of approximately 30 million live below the poverty line (OECD 2021). The country has a hybrid healthcare system, with the public sector providing most of the healthcare, mainly in primary health centres, health posts or secondary care hospitals, and by deploying community health workers or volunteers (Gyawali et al. 2020; Rai et al. 2018). Nepal lacks universal health coverage, and the voluntary Social Health Security Programme which was introduced in 2013 is still unaffordable for many (Ghimire et al. 2019; Mishra et al. 2015). Out-of-pocket expenditure has remained the principal means of financing healthcare, including cancer treatment, but this often leads to catastrophic health expenditure (Khatiwoda et al. 2019; Mishra et al. 2015; WHO 2017). Effective cancer control is therefore key in reducing health inequalities in Nepal.

Monitoring epidemiological trends in cancer through population-based cancer registries (PBCR) is important for cancer control, as it allows for the evaluation of the effectiveness of cancer screening programmes and the assessment of inequalities in cancer treatment, and supports the planning of cancer care services (Parkin 2008). In 2018, PBCR was introduced in Nepal in some districts, and although it was recently expanded, it still covers only 20% of the population (Gyawali et al. 2020; Subedi et al. 2020, 2021). The lack of a robust PBCR hinders not only the ability to assess cancer incidence and the impact of cancer in the country, but also makes the development of cancer management initiatives more difficult.

Health or cancer literacy also plays an important role in cancer control and prevention (Brand et al. 2019; Koirala et al. 2021; Oldach and Katz 2014). Increasing awareness of cancer risk factors can enhance cancer screening behaviours and cancer preventative practice, reduce the number of late presentations, and will help to remove the socio-cultural barriers to cancer care (Gyawali et al. 2020; Musa et al. 2017; Sentell et al. 2015). Additionally, determining levels of awareness about cancer and cancer risk factors is key to support the development and implementation of evidence-based intervention and/or screening programmes to curb the future burden of breast and cervical cancer in LMICs.

A previous review of CC screening practices and barriers in Nepal showed shortfalls in methodology (Kafle and Panth 2017), whereas a meta-analysis about BC awareness focused only on breast self-examination (BSE) (Sathian et al. 2019). Given the importance of BC and CC awareness and attitudes towards screening, a scoping review was conducted. A scoping review is a useful method where the aim is to understand and summarize the extent of research in a given area where data are varied and/or heterogeneous. The objectives of this review were to examine and map the levels of knowledge of BC and CC among Nepali women, to determine the use of screening practices for these cancers, and to assess women's attitudes towards these practices. The findings will contribute to a better understanding and could help lay the groundwork for the design of interventions and strategies to improve cancer outcomes and reduce inequalities for women in Nepal.

Methods

Review approach

This scoping review was conducted in accordance with relevant methodological guidance (Peters et al. 2015a, b), and the results were reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) guidelines (Tricco et al. 2018). A completed checklist can be found in the online Supplementary Information. A review protocol was developed and can be accessed upon request.

Search strategy and information sources

An initial limited search was performed to identify the primary search terms (e.g. analysis of the text words contained in the title and abstract, and index terms). The search strategy was developed with guidance from a health science subject librarian and pre-tested prior to the actual search. The following search terms and keywords were used: (Nepal*) AND (breast OR mammary OR cervi* OR uterine) AND (cancer* OR neoplasm* OR tumour* OR tumor* OR carcinoma OR malignan* OR colposcopy OR human papillomavirus OR HPV DNA OR PAP smear OR Pap smear test OR Papanicolaou OR direct visualisation OR liquid cytology OR visual inspection).

Five electronic databases (PsycINFO, PubMed, Global Health, Embase and CINAHL) were systemically searched for relevant studies published in English. No date restrictions were imposed, and citations published up to June 2021 were included. A grey literature search was undertaken (i.e. Google Scholar), and references and citations of eligible studies were reviewed (snowball sampling) for additional studies and reports of relevance. Studies were excluded if they were reviews, editorials or study protocols, or if data for female participants could not be disaggregated from the results. No further limits were placed on study design, in order to capture information from a wide range of sources and to determine the extent, range and nature of available

research on the topic. Table 1 shows a summary of the population, interest and context (PICo) inclusion and exclusion criteria for this scoping review.

Study selection

Articles identified from the final search of the databases were collated using Mendeley Reference Manager software, and duplicates were removed. Articles were primarily screened by their title and abstract by a reviewer (CR), tracking reasons for exclusions, and reviewed by a second researcher (HH). Following this initial screening process, further screening was conducted by reading the full articles and applying the criteria set out in Table 1. Three reviewers independently screened the data; disagreements were resolved through discussion, and decisions were tracked using an Excel spreadsheet.

Data extraction and charting

Data were extracted from the full texts by a single researcher (CR). A second researcher (HH) independently reviewed and extracted the data, testing validity. Differences in data extraction were resolved by discussion.

Data were obtained on study details (year published, country of origin, study purpose and methodology), population characteristics (setting, age, marital status and education/literacy levels),and main study outcomes. Data were charted regarding knowledge, practices and attitudes towards BC and CC. This included a quantitative/qualitative synthesis: the percentage that had heard of BC/CC, levels of knowledge of BC/CC (including risk factors, common symptoms and treatment options), attitudes towards the cancers or screening for the cancers (including barriers to/facilitators of screening or treatment), sources of information, and factors associated with knowledge and attitudes.

Quality assessment

A quality assessment was not conducted, which is consistent with guidance on scoping review conduct (Peters et al. 2015a, b).

Results

Search results

Figure 1 shows the PRISMA diagram of the process used in paper selection. The search returned 687 citations. After duplicates were removed, 615 were screened via their titles and abstract. The full texts of 58 citations were obtained for further review. Twenty studies were excluded; reasons outlining the exclusion of these studies are displayed in Fig. 1. A total of 38 articles were included in this scoping review. All studies were published between 2001 and 2021, and nearly half (45%) within the last 5 years. Twenty-seven (71%) studies focused on CC (Baral et al. 2020; Bhatta et al. 2020; Darj et al. 2019; Ghimire and Pathak 2020; Andersen et al. 2020; Gyenwali et al. 2013; Johnson et al. 2014; Joy et al. 2011; Khadka et al. 2017; Maharjan et al. 2020; Pandey and Karmacharya 2017; Poudel and Sumi 2019; Rachana and Giri 2019; Ranabhat et al. 2014; Ranjit et al. 2016; Satyal 2013; Shakya et al. 2016; Sherpa 2007; Sherpa et al. 2020; Shrestha et al. 2013; Shrestha 2014; Shrestha and Dhakal 2017; Shrestha 2017; Shrestha et al. 2020; Shrestha et al. 2021a; Thapa 2018; Thapa et al. 2018;). Ten studies (26%) concerned BC (Bhandari et al. 2016; Bhandari et al. 2021; Bhatt et al. 2011; Braun and Itano 2011; Gupta et al. 2015; Narasingrao et al. 2013; Parajuli and Mandal 2010; Sathian et al. 2014; Shrestha 2012; Shrestha et al. 2017). One study evaluated knowledge, attitude and screening practice for both cancers (Shah et al. 2010).

Most studies had a cross-sectional quantitative design; three studies were qualitative and used focus groups or in-depth interviews (Darj et al. 2019; Andersen et al. 2020; Shrestha et al. 2020). One case report (Braun and Itano 2011) and one conference abstract (Shrestha 2017) were included in the review. Four studies were not published in peer-reviewed journals: two master's dissertations (Sherpa 2007; Shrestha 2014), one PhD thesis (Satyal 2013) and one government research report (Shah et al. 2010). Sample sizes ranged from 1 to 1420. A total of 12,844 women were included in CC studies and 3268 in BC studies. While not all studies specified, both urban and rural settings were represented. The mean age of participants ranged from 17

Table 1 Population, Interest and Context (PICo) based inclusion and exclusion criteria

	Included	Excluded
Problem	• Breast and cervical cancer	• Articles relating to other cancers
Population	• Women, of all ages, living in all areas of Nepal	• Populations outside of Nepal • Studies including Nepali migrants
Interest	• Knowledge/awareness • Attitudes • Screening practice/behaviours	• The biochemistry or pathological subtypes of breast or cervical cancer in Nepal
Context	• Nepal	• Countries outside of Nepal

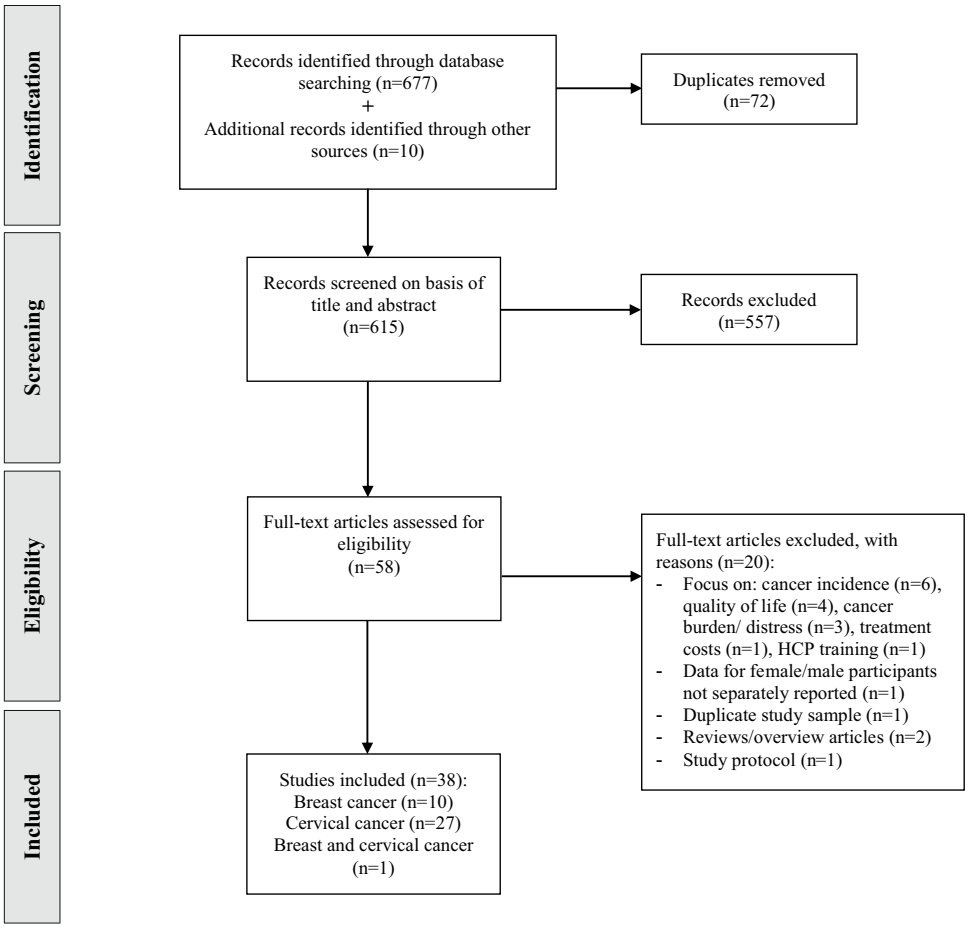

Fig. 1 Flowchart of study identification and selection

to 53 years. Levels of illiteracy were reported in 21 studies (53%) and ranged from 4% (Narasingrao et al. 2013) to 66% (Gyenwali et al. 2013). Study participants included students, housewives, mothers of high school students, teachers, nurses, visitors to health clinics, gynaecological in- and outpatients, and CC survivors. The majority of studies used researcher- or clinician-administered (semi-)structured surveys ($n=25$, 66%) in face-to-face interviews, or self-administered surveys ($n=8$, 21%). Ten studies reported knowledge or awareness scores, predominantly focusing on CC (Bhatt et al. 2011; Baral et al. 2020; Darj et al. 2019; Ghimire and Pathak 2020; Khadka et al. 2017; Poudel and Sumi 2019; Rachana and Giri 2019; Shrestha et al. 2013; Shah et al. 2010; Shrestha and Dhakal 2017). A review of medical records was carried out in one study (Shrestha 2014), and two studies offered women a Papanicolaou or Pap smear test (Ranabhat et al. 2014; Sherpa 2007).

Breast cancer results

General knowledge of breast cancer and symptoms The main characteristics of the selected BC studies ($n=11$) are shown in Table 2. Knowledge of BC and its main symptoms varied widely. Shrestha (2012) found that only 30% of hospital outpatients had heard of BC. The percentage of women who correctly identified a breast lump as the main presentation of BC ranged from 5% (Sathian et al. 2014) to 78% (Shrestha et al. 2017). Bhatt et al. (2011) noted that among 100 gynaecological inpatients, 89% knew that BC usually presents as a lump; however, 61% did not know that it can be painless. In contrast, Shrestha (2012) found that 61% knew that a painless lump and 100% that an axillary lump could be a sign of BC. Shrestha (2017) noted that 82% knew that BC can be a painless abnormal growth in the breast. Conversely, a study conducted on 1420 women and students in urban and rural regions of Pokhara valley found that just 5% were aware that a breast lump is a warning sign for BC (Sathian et al. 2014). A study among healthcare professionals (HCPs) by Shah et al. (2010) showed that 84% of nurses and midwives were aware of BC signs and symptoms. Bhatt et al. (2011) found that mean knowledge scores of study participants was 65%, and scores were higher among highly educated women, professionals and women counselled during medical visits. Common sources for BC information were television and radio (Shrestha 2012; Bhandari et al. 2016).

Table 2 Characteristics of selected breast cancer studies

Author (Year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Bhandari et al. (2016)	Cross-sectional study Self-administered survey and modified CBCKT	283 female higher secondary school students[a] aged 14–22	62% Grade 12[b]	Urban + rural	*Knowledge* 59% knew that physical exercise, 47% that breastfeeding protects against BC 14% knew that early menarche, 22% that delayed menopause, 35% that oral contraceptives, 22% that increasing age are risk factors for BC; 13% knew that women without risk factors may develop BC 23% believed that breast pain was the most common BC symptom 37% were aware of treatment options other than mastectomy; 47% knew of lumpectomy/radiotherapy 44% believed that BC treatment is not possible after lump felt, 40% that normal life is not possible after BC diagnosis

Table 2 (continued)

Author (Year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Bhandari et al. (2021)	Cross-sectional study Researcher-administered (piloted) survey using TPB concepts, fatalism, perceived susceptibility, perceived severity	500 women aged 40–69	10% illiterate 18% ≥ bachelor degree	Urban	*Attitude* 65% would not have biennial mammography; 57% would not have annual CBE 20% strongly intended monthly BSE *Practice* 90% had never had mammography; 3.4% had biennial mammography 80% had never had CBE; 7% had annual CBE 59% had never practised BSE; 14% had monthly BSE *Other* Women participating in BC awareness programmes more likely to intend to have mammography Those with perceived susceptibility to BC more likely to intend to have mammography Women with high fatalistic beliefs less likely to intend to have CBE Positive attitude, higher subjective norms and perceived behavioural control associated with intention to have mammography; positive attitude and higher subjective norms associated with likelihood of having CBE

Table 2 (continued)

Author (Year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Bhatt et al. (2011)	Cross-sectional study Physician-administered semi-structured (piloted) survey Knowledge scores calculated	100 gynaecological inpatients aged 19–65	19% illiterate 49% primary or secondary education 32% > secondary education	Urban + rural[c]	*Knowledge* Mean knowledge score 13 (range 2–20) 83% recognised that breast lesions can predispose to BC 56% knew BC risk is associated with age 50% correctly attributed genetic, lifestyle, breastfeeding to BC causation/protection 41% believed BC can be caused by contamination 89% knew BC usually presents as lump; 61% no awareness that lumps can be painless 85% aware that monitoring for abnormal change(s) is useful for early detection 56% had not heard of mammography *Attitude* 83% would have screening if offered Reasons for no interest in screening: lack of perceived problems (45%), not necessary (45%), finances (10%) *Practice* 10% had breast screening in past 2 years Main reasons for lack of BC screening: no knowledge (52%), no perceived problem (35%), refusal (7%), shyness (4%), difficulty in receiving services (2%)

Table 2 (continued)

Author (Year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Braun and Itano (2001)	Case report study Semi-structured interviews and observation	1 BC patient aged 33 years	Illiterate	Rural	*Knowledge:* No knowledge of BC until diagnosis; no knowledge of BSE or risk factors No awareness that BC is serious or that early treatment results in higher survival rates *Other:* Surgery delayed (5 months) due to lack of time/finances
Gupta et al. (2015)	Cross-sectional population-based study using SOSAS	15 women with untreated breast masses aged 22–75	47% illiterate Education not specified	Urban + rural	*Other* 53% had breast mass for >1 year; 20% for ≤1 year, 27% for <1 month 53% sought healthcare (38% minor procedures); not seeking care related to lack of perceived need, trust or finances Main barriers to surgical care: fear, lack of trust 60% had unmet surgical needs (excluding those with no perceived need for healthcare)
Narasingrao et al. (2013)	Cross-sectional study Researcher-administered survey	100 mothers aged 20–40	4% illiterate 61% < primary education 6% graduate level	Rural	*Knowledge* 46% poor, 45% average, 9% good *Attitude* 89% good, 11% fair
Parajuli and Mandal (2010)	Cross-sectional study Self-administered survey	220 medical, dental and nursing students aged 20–30	Graduate-level students	Urban[d]	*Knowledge* 35% medical/nursing students, 30% dental students knew about BC 66% knew about mammography *Attitude* 62% comfortable about doing BSE *Practice* BSE practice highest in medical students, lowest in dental students Reasons for not doing BSE: lack of knowledge (23%), felt it was unnecessary (12%), lacking time (12%), lacking confidence (7%), fear of finding abnormalities (2%) 91% had never had breast examination from HCP

Table 2 (continued)

Author (Year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Sathian et al. (2014)	Cross-sectional study Researcher-administered semi-structured survey	1420 women and female students (33%) aged 15–68	9% illiterate 36% primary education 29% graduate level	Urban + rural	*Knowledge* 5% knew that breast lump can be a sign of BC Low awareness for: lump under armpit (n = 68), bleeding/discharge nipple ($n = 63$), nipple position change ($n = 69$), redness breast skin ($n = 65$), pain in breast/armpit ($n = 68$) 24% knew about BSE, 20% about mammogram Knowledge screening/warning signs higher among nurses, graduates, women with professional jobs *Practice* 4% had CBE in past year
Shah et al. (2010)	Cross-sectional study Self-administered survey (piloted) (piloted) Knowledge scores calculated	204 nurses and midwives aged 20–57	4% bachelor/master degree	Not stated	*Knowledge:* 16% adequate knowledge BC risk factors: 33% knew that increasing age, 65% lack of exercise are risk factors; 40% aware that BC is hereditary 68% adequate knowledge on screening modalities: 43% knew screening can increase BC survival, 62% that mammography can detect lumps that cannot be felt, 42% aware of age to start yearly mammography, 81% about age to start BSE 58% knew correct timing of BSE 84% aware that discharge, lump, hard knot, dimpling/changes skin colour are BC signs/symptoms; 72% knew to look for changes in breast symmetry Knowledge associated with practice of BSE/positive attitude towards mammography screening *Practice* 52% had never done BSE; 48% did BSE but not regularly

Table 2 (continued)

Author (Year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Shrestha (2012)	Cross-sectional study Researcher-administered survey (piloted)	110 hospital outpatients aged 20–60	35% primary education	Rural	*Knowledge* 30% knew about BC (61% of these knew that painless lump and 100% that axillary lump are BC signs) General poor knowledge of BC risk factors 26% knew about BC screening methods; all lacked knowledge of age for starting mammogram screening *Practice* 24% had done BC screening: 70% BSE, 15% ultrasound scan, 12% mammogram
Shrestha et al. (2017)	Cross-sectional study Researcher-administered survey	50 women aged 20–45	24% secondary education 20% higher secondary 18% graduate level	Urban	*Knowledge* 78% knew that BC is a growth/lump in the breast; 82% knew that BC can be painless 82% knew that BSE/10% that mammography can diagnose BC at an early stage >64% had knowledge on how/when to do BSE; limited knowledge of using circular motions and timing BSE for postmenopausal women 10% knew about mammograms

BC breast cancer, *BSE* breast self-examination, *CBCKT* Comprehensive Breast Cancer Knowledge Test (Stager, 1993), *CBE* Clinical Breast Examination, *HCP* healthcare professional, *SOSAS* Surgeons OverSeas Assessment of Surgical need survey (Groen et al. 2012, Ntirenganya et al. 2014), *TPB* theory of planned behaviour

[a]Total sample size is 516; 55% female

[b]Data for female students only not specified

[c]Hospital located in urban area but patients come from all over Nepal

[d]Location of study site in urban area but participants (students) come from all over Nepal

Knowledge of breast cancer risk factors A common theme in Table 2 is that knowledge of BC risk factors is poor. Bhandari et al. (2016) surveyed 283 female secondary students and found that 14% knew that early menarche, 22% that delayed menopause, and 35% that the use of oral contraceptives are risk factors. Of the women Bhatt et al. (2011) included in their study, 56% knew that BC is more common in older people; however, 41% incorrectly believed that contamination can cause BC. Shah et al. (2010) noted that 33% knew that increasing age and 65% that lack of exercise are risk factors. Furthermore, 40% were aware that BC can be hereditary. Shrestha (2012) reported that general knowledge of BC risk factors was poor among participants.

Knowledge and practice of breast cancer screening Breast self-examination (BSE) was mentioned in seven studies (Bhandari et al. 2021; Shrestha et al. 2017; Sathian et al. 2014; Shrestha 2012; Parajuli and Mandal 2010; Braun and Itano 2011; Shah et al. 2010). Shrestha et al. (2017) found that of 50 reproductive-aged women from an urban area, 82% knew that BSE can lead to an early BC diagnosis, whereas in a study conducted with 1420 women in Pokhara valley, only 24% had heard of BSE.

Bhandari et al. (2021) reported on attitudes and practice towards BSE: 59% never practised BSE, 14% had monthly BSE and 20% strongly intended to do monthly BSE. Practice of BSE varied in other studies; Shah et al. (2010) reported that 48% were performing BSE but not regularly. In contrast, Shrestha (2012) reported that 70% were practising regular BSE; however, there was limited knowledge on the use of circular motions and timing of BSE for postmenopausal women.

Higher rates of BSE practice were seen in medical students (compared to dental/nursing students) and those with more knowledge of risk factors and BC screening modalities for BC (Parajuli and Mandal 2010; Shah et al. 2010). Reasons cited for not practicing BSE other than lack of knowledge included not believing BSE to be necessary, lack of time, lack of confidence and fear of finding abnormalities (Parajuli and Mandal 2010). The most common sources for BSE information were HCPs (60%) or media (36%) (Shrestha et al. 2017).

Seven studies mentioned mammography; five included urban women (Bhandari et al. 2021; Shrestha et al. 2017; Shrestha 2012, Bhatt et al. 2011; Parajuli and Mandal 2010), one included rural and urban women (Sathian et al. 2014), and one did not specify the population (Shah et al. 2010). Sathian et al. (2014) reported that 20% had heard of mammography, Bhatt et al. (2011) found it to be 44% and Parajuli and Mandal (2010), 66%. Shrestha et al. (2017) found that 10% knew that mammography aids early diagnosis of BC; however, most had no awareness that mammograms can be used for BC screening. Shah et al. (2010) noted that 62% knew mammography can detect lumps that cannot be felt, and 42% knew that yearly mammography is recommended to women aged 50 and over. Sathian et al. (2014) showed that knowledge of mammography was better in nurses, graduates and professionals compared to women from lower educational backgrounds (Sathian et al.; 2014).

Four studies reported on the uptake of mammography. Studies conducted by Bhandari et al. (2021), Shrestha (2012) and Bhatt et al. (2011) were based in urban areas and found uptake of mammography to be 10% (3.4% biennial mammography), 2.7% and 2.3%, respectively. The population was mixed rural and urban in the study conducted by Shah et al. (2010), and here just 1% had undergone mammography. Reasons for never having been screened for BC included lack of knowledge (52%), no perceived problem (35%), refusal (7%), shyness (4%) or difficulty in receiving services (2%) (Bhatt et al. 2011). Bhatt et al. (2011) found that knowledge of mammography was significantly related to education and counselling done during medical visits. This was confirmed in a recent study by Bhandari et al. (2021), where women who had attended BC awareness programmes were more likely to intend to have a mammogram. This study also found that positive attitude, higher subjective norms and perceived susceptibility to BC were associated with the intention to undergo mammography.

Only one study mentioned clinical breast examination (CBE) (Bhandari et al. 2021). In an urban population of 500 women aged 40–69 years, only 20% were familiar with CBE and 7% had annual CBE; 57% had a negative attitude towards CBE, most of whom were women with high fatalistic beliefs.

Impact of poor knowledge on screening behaviours Poor knowledge about BC impacts treatment-seeking behaviours. Gupta et al. (2015) noted in a study using a population-based survey of surgical needs that 33% did not receive surgical care for BC. Reasons cited were believing there to be no need for surgery, fear or lack of trust, and not having the financial assets for surgical care. Braun and Itano (2001) presented a case report of a 33-year-old woman with BC who delayed surgery by 5 months. This was due to multiple factors, including inability to pay for surgery or to take time away from household duties, lack of awareness of the seriousness of BC, and not understanding that earlier treatment would improve prognosis. The patient did not know what BC was prior to diagnosis and lacked knowledge of BC risk factors and BSE.

Cervical cancer results

General knowledge of cervical cancer and symptoms Table 3 presents an overview of the 28 papers exploring knowledge,

Table 3 Characteristics of selected cervical cancer studies

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Andersen et al. (2020)	Cross-sectional Qualitative study: 4 focus groups, 4 in-depth interviews with health workers	44 women aged 30–60 (incl. 12 community health volunteers)	6% < primary, 42% primary education	Urban	*Practice* 47% attended CCS Barriers: lacking permission of husband, fear of social exclusion/gossip, poverty, transportation costs Facilitators: autonomy making own health-related decisions, public awareness campaigns to reduce stigma, screening free of charge, female doctors/nurses conducting CCS and consultations
Baral et al. (2020)	Cross-sectional Researcher-administered survey Total awareness score	170 hospital outpatients and visitors aged 16–49	13% illiterate	Urban	*Knowledge* 89% had heard of CC 70% knew about CCS (11% adequate CCS awareness) 10% aware that HPV vaccination can prevent CC Awareness associated with employment status *Attitude* 47% positive attitudes towards CCS Ethnicity, employment status, marital status associated with attitude
Bhatta et al. (2020)	Cross-sectional Researcher-administered (piloted) survey	630 health camp attendees (incl. Bhutanese refugees) aged 19–69	30% Nepali women, 34% Bhutanese women no formal education	Urban	*Knowledge* 68% had heard of CC 22% knew that HPV can cause CC, 14% knew about HPV vaccine Lack of awareness regarding STIs associated with lack of awareness regarding CC Poor awareness in 42% Bhutanese and 31% Nepali women *Attitude* 95% would vaccinate children if given free vaccine

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Darj et al. (2019)	Cross-sectional Qualitative study with 7 focus groups Knowledge scores calculated	72 gynaecology outpatients aged 25–60	Not stated	Urban	*Knowledge* Low levels of knowledge; misconceptions about CCS Lack of awareness barrier to seeking healthcare Misconceptions about risk factors incl. participant awareness programme *Practice* Barriers to CCS: socio-cultural, service providers' behaviour, geographical challenges, limited finances Facilitators of CCS: participation awareness programmes, family support and women's groups
Ghimire and Pathak (2020)	Cross-sectional Researcher-administered (piloted) survey Total knowledge score	220 gynaecology outpatients aged 20–60	11% illiterate 34% secondary education	Urban	*Knowledge* 42% knew CCS was available at the hospital 79% low knowledge of CCS services; 60% did not know costs of CCS *Practice* 61% never had CCS CCS uptake associated with: age (< 35 years less likely to have CCS); education; awareness of cost (those aware of costs more likely to get screened); increased knowledge of availability of health services
Gyenwali et al. (2013)	Cross-sectional Researcher-administered structured survey Review medical records	110 CC patients aged 27–79	66% illiterate	77% Rural 23% Urban	*Knowledge* 31% had heard of CC 16% knew about Pap smear test prior to diagnosis Literate women and those with abnormal vaginal bleeding less likely to have late diagnosis

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Johnson et al. (2014)	Cross-sectional HCP-administered survey	749 health camp participants (mean age 38)	81% formal education	Rural	*Knowledge* 53% knew about CC; more knowledge among women from suburban areas (63% vs. 43%) 15% had heard of HPV: of these, 34% knew about HPV vaccine 12% aware that HPV infection can cause CC *Attitude* 78% willing to vaccinate their children against HPV if freely available
Joy et al. (2011)	Cross-sectional Self-administered anonymous structured survey	1268 female students from Asia, incl. 480 Nepali (mean age 19)	Undergraduates	Urban	*Knowledge (N = 480)* 59% had heard of CC 53% knew about HPV: 51% that it can be transmitted through multiple sexual partners, 43% that condom use does not prevent HPV transmission Awareness risk factors: 39% knew about early age sexual debut, 20% about smoking, 13% about diet-related factors, and none about hereditary risk factors

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Khadka et al. (2017)	Cross-sectional Researcher-administered survey Knowledge scores calculated	600 women aged 15–49	6% illiterate 16% primary, 28% secondary, 30% higher secondary, 6% university degree 27% students	Rural	*Knowledge* 78% had heard about CC. Of women who knew about CC: 71% aware of symptoms and 48% of risk factors (most cited: early age sexual debut, multiple sexual partners, poor personal hygiene) 16% knew about CCS, 7% about Pap smear test 5% had heard of HPV; of these, 80% knew HPV is sexually transmitted, 30% that HPV can cause CC, 3% knew about HPV vaccine 52% had inadequate knowledge of CC Education level, occupation, and income were associated with knowledge of CC, HPV and screening *Attitude* 90% willing to have HPV vaccine if provided for free Barriers to HPV vaccine: low awareness, financial issues, concerns about side effects Older age, higher income associated with willingness to accept the vaccine *Practice* 14% had attended CCS

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Maharjan et al. (2020)	Cross-sectional Researcher-administered survey and NHBMS	510 women from mountainous ($n=216$; 66% <30 years) and lowland areas ($n=294$; 58% <30 years)	Mountainous area 51% formal education Lowland area 99% formal education	Urban	*Knowledge* 20% from mountainous area and 35% from lowland area had heard of CC 29% from mountainous area and 49% from lowland area knew about CCS *Practice* 15% from mountainous and 20% from lowland area had CCS Screening more common in older women and those with family history of CC 69% from mountainous and 60% from lowland area preferred female HCP to conduct CCS Perceived barriers: scarcity of nearby healthcare facility (mountainous 40%, lowland 28%); fear of positive results/consequences of CC diagnosis (mountainous 44%); ashamed of gynaecological examination (mountainous 51%, lowland 31%)
Pandey and Karmacharya (2017)	Cross-sectional Researcher-administered structured survey based on HBM	180 women aged 30–60	26% illiterate 9% primary, 27% secondary, 9% higher secondary education, 1% university level	Rural	*Knowledge* 94% had heard of CC, 81% of CCS *Practice* 48% screened in the past: 57% once, 49% in past 3 years, 45% in private clinics 70% screened on advice of HCP CCS associated with educational level (not with susceptibility, perceived benefits/barriers, age, parity)

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Poudel and Sumi (2019)	Cross-sectional Self-administered survey (piloted) based on HBM and CCKP Knowledge scores calculated	253 pairs of mothers (mean age 40) and high school students (128 females, mean age 15)	41% illiterate 10% primary/15% secondary education 34% ≥ university degree	Urban	*Knowledge* Female students: 26% talked about CC with others; 64% knew that CCS could prevent CC; 51% knew that HPV is risk factor for CC and 15% that HPV vaccine can prevent CC Mothers: 60% never discussed CC; 32% knew about CCS, 65% knew that CCS could prevent CC; 40% knew that HPV is a risk factor and 17% that HPV vaccine can prevent CC Knowledge scores: students mean 11.1 (± 4.6), mothers mean 10.3 (± 4.8) *Practice* 15% of mothers attended CCS; main barriers less perceived susceptibility, lack of knowledge *Other* Female students, those with healthy diets or attending discussions on cancer had better awareness Mothers of female students had better CC knowledge Cancer communication increased CC awareness in both groups
Rachana and Giri (2019)	Cross-sectional Self-administered survey Knowledge scores calculated	150 students (mean age 19)	Undergraduates	Urban	*Knowledge* 95% inadequate knowledge of CC 59% knew that CC is abnormal cell growth in cervix 63% knew that CC is preventable; 38% knew that HPV vaccine, 9% Pap smear test could prevent CC *Other* No significant association between knowledge and age, religion, ethnicity, family income, smoking or sexual practice

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Ranabhat et al. (2014)	Cross-sectional Researcher-administered (piloted) structured survey Pap smear test	607 gynaecology outpatients aged 18–50	Not stated	67% Rural 33% Urban	*Knowledge* 34% knew about CC 19% knew about Pap smear test Lack knowledge about age initiation/cessation, screening interval *Attitude* 27% favourable, 73% unfavourable *Practice* 84% had never had Pap smear test 16% inadequate practice CCS associated with knowledge CC/Pap smear test, favourable attitude, urban living, being 36–50 years
Ranjit et al. (2016)	Cross-sectional Secondary data analysis nationwide researcher-administered survey (SOSAS)	829 women aged 21–65 (from 1397 households)	40% illiterate	66% Rural 34% Urban	*Knowledge* 13% knew about Pap smear tests *Practice* 5% attended CCS 63% (women with knowledge) never had Pap smear test Lack of CCS associated with illiteracy, unemployment, living in a rural area

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Shah et al. (2010)	Cross-sectional Self-administered structured (piloted) survey Knowledge scores calculated	204 nurses and midwives aged 20–57	Professional degree, incl. 4% university degree	Not stated	*Knowledge* 50% adequate knowledge on general information, risk factors, screening modalities for CC 94% knew that CC is most common cancer for Nepali women 78% knew that abnormal vaginal bleeding and 67% that abnormal vaginal discharge can be signs of CC 32% knew that HPV infection can cause CC, 31% that HPV vaccine can prevent CC *Attitude* 68% interested in CCS following study participation Knowledge about risk factors/ screening modalities associated with positive attitude *Practice* 98% had never had CCS, 58% thought it was not necessary CCS practice not related to knowledge

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Shakya et al. (2016)	Cross-sectional Researcher-administered (piloted) semi-structured survey	122 members of micro-finance women's group aged 18–68	62% illiterate 35% < secondary, 3% > secondary education	Rural	*Knowledge* 6% had heard of CC; 61% did not know CC symptoms; 25% cited incorrect symptoms No knowledge about HPV, Pap smear test 96% mentioned at least one factor they considered to be CC risk factors; 87% cited correct risk factors Most commonly perceived risk factors: abnormal vaginal discharge, multiple sexual partners, multiparity *Attitude* Before educational session: 16% willing to have CCS, 59% unsure (59% not sure if at risk of developing CC), 25% did not want CCS (87% did not believe to be at risk of developing CC) All women in favour of CCS after educational session
Satyal (2013)	Cross-sectional Researcher-administered semi-structured (piloted) survey, incl. HBM	121 participants aged 30–60 in CC prevention/awareness programs	43% no education, 17% college-level education or higher	Not stated	*Practice* 63% attended CCS No differences in perceived susceptibility/seriousness between screened/unscreened women Screened women scored higher on perceived benefits and perceived barriers Barriers: feeling embarrassed (69%) or awkward (59%), takes too much time (68%), interferes with family obligations (64%), painful procedure (45%) Benefits: better survival (92%), early diagnosis (82%) Education (lower) associated with having CCS

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Sherpa (2007)	Cross-sectional Researcher-administered structured (piloted) survey Pap smear test	1033 women aged 16–59	45% illiterate	Urban	*Knowledge* 59% had never heard of CC, which was associated with no/low education level 26% knew CC is preventable, 25% knew CC is treatable *Attitude* 5% refused Pap smear test in study, 41% because of feeling ashamed *Practice* 39% had Pap smear test before (29% aged 16–29) Women with CC knowledge twice as likely to have had Pap smear test
Sherpa et al. (2020)	Cross-sectional Researcher-administered (piloted) structured survey	102 female high/secondary school teachers aged 20–56	86% bachelor or master degree	Urban	*Knowledge* 80% had heard of CC 32% had heard of Pap smear test and 21% of VIA 13% had heard of HPV vaccine, < 1% knew about link between HPV infection and CC *Practice* 79% had never had cervical examination (41% because they had no symptoms)

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Shrestha et al. (2013)	Cross-sectional Researcher-administered structured (piloted) survey KAP scores calculated	105 gynaecology outpatients (mean age 30)	19% illiterate, 18% higher secondary school, 16% university degree	84% Urban 16% Rural	*Knowledge* 66% had heard of CC 43% knew about CCS; 18% about Pap smear test 42% unaware how regularly Pap smear tests are done; 86% thought all women >30 years should have CCS KAP score highest in women: aged 40–59, from urban areas, married >20 years *Attitude* > 85% positive attitude towards CCS *Practice* 11% attended CCS in past, but 55% only screened once Main reasons for not being screened: lack of symptoms (53%) and knowledge (32%)
Shrestha (2014)	Cross-sectional Researcher-administered structured survey	100 women aged 15–60	18% primary, 42% secondary, 21 higher secondary education, 8% university degree	Urban	*Knowledge* 96% had heard of CC; 55% knew that abnormal vaginal discharge, 61% abnormal vaginal bleeding are CC symptoms 74% knew that CC is preventable, 39% that HPV infection increases CC risk 53% had heard about Pap smear test; 69% knew that it is for early detection 16% knew when to initiate CCS, 21% knew correct screening interval 44% did not know whether Pap smear tests were painful *Practice* 13% had Pap smear test; 11% at correct screening interval Higher education, adequate CC knowledge, adequate knowledge/attitude towards Pap smear test related to adequate practice

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Shrestha (2017)	Cross-sectional Self-administered survey	2529 women aged 17–83 attending free CCS camps	56% illiterate	Rural	*Knowledge* 24% knew about CC 6% knew CC risk factors 39% had heard about Pap smear test 10% knew about screening eligibility, 2% about screening interval, 17% about Pap smear tests 78% did not feel susceptible to CC *Practice* 82% had never been screened before; main reasons: lack of knowledge (60%), no symptoms (18%), embarrassment (3%)
Shrestha and Dhakal (2017)	Cross-sectional Researcher-administered (piloted) survey Knowledge scores calculated	96 gynaecology outpatients (mean age 39)	15% illiterate 26% primary, 35% secondary, 34% higher secondary education	Urban	*Knowledge* 56% knew about CCS; 69% aware that Pap smear test is for CCS 12% believed that women with HPV vaccine did not need CCS Level of CCS knowledge associated with level of education *Attitude* 10% would have CCS, if given information and opportunity *Practice* 19% had CCS, 78% for diagnostic purposes Main reasons lack of CCS: not feeling ill (92%), not recommended (24%), lack of knowledge (8%), embarrassment (5%) *Other* 9% involved in CC prevention and screening awareness programme

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Shrestha et al. (2020)	Cross-sectional Qualitative study with 2 focus groups	17 CC survivors (> 2 years post-treatment) aged 35–81 years	65% illiterate 12% primary, 24% secondary education	Urban	*Knowledge* Most did not know what causes CC; reported risk factors: fair skin, short birth spacing, bearing too many children, unhealthy dietary habits, use of tobacco, use of homemade menstrual cloths Most did not know about HPV infection or that it can cause CC 12% informed about HPV by HCPs following their CC diagnosis Most experienced unexplained vaginal bleeding and attributed this to postmenopausal changes *Practice* None had a Pap smear test before their CC diagnosis; avoided screening due to shame, embarrassment and having no symptoms *Other* Some treated well by family following diagnosis. Others subjected to stigma attached to CC, this had negative impact, incl. physical/social isolation, verbal abuse, self-stigma, fear
Shrestha et al. (2021a)	Cross-sectional Researcher-administered (piloted) survey	729 women aged 30–60	54% < primary education	Urban	*Knowledge* 97% knew about CC (26% symptoms, 61% risk factors) 6% knew that CC is abnormal cell growth 55% had heard about CCS 99% did not know about HPV or vaccine *Practice* Reasons for lack of screening: no symptoms or discomfort (≈62%), lack information (≈18%)

Table 3 (continued)

Author (year)	Study design Data collection method	Participants	Literacy/education levels	Setting	Key findings
Thapa (2018)	Cross-sectional Structured survey	205 gynaecology outpatients	8% illiterate 4% primary, 26% secondary, 21% > secondary education	Urban	*Knowledge* 74% had heard of CC; 74% aware of at least 1 symptom 85% aware of at least 1 risk factor; 31% knew that HPV infection was risk factor 65% knew of at least one preventive measure; 17% knew that HPV vaccine was preventative; 39% aware of Pap smear test Education level associated with knowledge *Practice* 17% had Pap smear test; main reason not having tests was lack of knowledge (78%), feeling healthy (9%), financial (4%)
Thapa et al. (2018)	Cross-sectional Researcher-administered structured survey	360 female hospital visitors aged ≥20	46% illiterate 15% primary, 42% secondary, 36% higher than secondary education	Urban	*Knowledge* 87% had inadequate knowledge of CC 42% knew that multiple sexual partners, 17% that HPV infection are risk factors 21% knew that HPV vaccine and 26% that regular CCS can prevent CC *Attitude* 72% had a favourable attitude towards CCS *Practice* 85% never had CCS Barriers: no symptoms (50%), lack of awareness (46%), embarrassment (24%) Facilitators: positive family history of cancer

CC cervical cancer, *CCS* cervical cancer screening, *CCKP* Cervical Cancer Knowledge Prevention (Jaglarz et al. 2014), *HBM* Health Belief Model (Turner et al. 2004), *HCP* healthcare professional, *HPV* human papillomavirus, *KAP* Knowledge, Attitude and Practice, *NHBMS* Nepali Health Belief Model Scale (Champion 1984, 1993), *SOSAS* Surgeons OverSeas Assessment of Surgical need survey (Groen et al. 2012, Ntirenganya et al. 2014), *STI* sexually transmitted infection, VIA visual inspection with acetic acid

attitudes and screening practices with respect to CC. The percentage of women who had heard of CC ranged from 6% (Shakya et al. 2016) to 97% (Shrestha et al. 2021a). The study with the lowest percentage was conducted in a rural area and involved 122 members of a micro-finance women's group. The study with the highest percentage took place among 729 participants recruited for a community-based intervention study to improve cervical cancer screening uptake in Pokhara Metropolitan.

Knowledge of signs and symptoms of CC varied widely among studies (Khadka et al. 2017; Shakya et al. 2016; Shah et al. 2010; Shrestha 2014; Shrestha et al. 2020; Shrestha et al. 2021a; Thapa 2018; Thapa et al. 2018). Although almost all women in the study by Shrestha et al. (2021a) had heard about CC, only 26% were aware of symptoms and 6% knew that CC is an abnormal cell growth. Shakya et al. (2016) found that 61% lacked knowledge of symptoms, and of those who mentioned symptoms, 25% reported incorrect information. Another study reported that respectively 55% and 61% of women knew that abnormal vaginal discharge and bleeding are CC symptoms (Shrestha 2014). Khadka et al. (2017) found that 55% were aware of warning signs and symptoms of CC, and of those, 97% believed it to be a fatal disease.

The main sources for CC knowledge were media (i.e. television), social media, friends and family, and government clinics (Bhatta et al. 2020, Poudel and Sumi 2019; Thapa 2018; Pandey and Karmacharya 2017; Sherpa 2007).

Increased knowledge of CC was associated with living in a suburban area (Johnson et al. 2014), higher education levels, certain occupations and monthly household incomes (Khadka et al. 2017). Mothers of female students had better knowledge than mothers of male students (Poudel and Sumi 2019). A study of 150 female undergraduate students, however, found no significant association between knowledge and selected variables, including age, family income and smoking (Rachana and Giri 2019).

Knowledge of cervical cancer risk factors Eleven studies reported on knowledge of CC risk factors (Darj et al. 2019; Joy et al. 2011, Khadka et al. 2017; Poudel and Sumi 2019; Shah et al. 2010; Shakya et al. 2016; Shrestha 2014; Shrestha 2017; Shrestha et al. 2021a, b; Thapa 2018; Thapa et al. 2018). Shrestha et al. (2021a) found that of the 729 women interviewed from an urban area, 61% correctly identified risk factors for CC. Thapa (2018) found that of 205 women living in an urban area, 85% were aware of at least one risk factor for CC. Khadka et al. (2017) interviewed 600 rural women, and 37% were aware of risk factors. Most women cited early age of sexual debut, multiple sexual partners and poor personal hygiene. In contrast, Shrestha (2017) found that of 2529 rural women, just 6% had knowledge of risk factors. Studies also showed that misconceptions around CC and its symptoms still persist among women in Nepal. Shakya et al. (2016) reported that in a group of 122 women aged 18 to 68 years, 96% mentioned one or more CC risk factors but 13% cited incorrect information. A qualitative study in 17 CC survivors showed that most were unaware of what causes CC, and some reported incorrect risk factors such as having fair skin or using homemade menstrual cloths (Shrestha et al. 2020). Darj et al. (2019) found that misconceptions about risk factors persisted even after participation in a CC awareness programme.

Knowledge and practice of cervical cancer screening With the exception of four studies (Bhatta et al. 2020; Johnson et al. 2014; Joy et al. 2011; Sherpa et al. 2020), all assessed knowledge and/or attitudes towards cervical cancer screening (CCS) and screening practice. CCS knowledge varied widely. Shakya et al. (2016) found that all women ($n = 122$) who had participated in community-based educational meetings lacked knowledge of Pap smear tests. In contrast, Pandey and Karmacharya (2017) found in a researcher-administered survey among 180 women that 81% had heard of CCS, mainly (57%) through information from HCPs. Both studies took place in rural areas.

The number of women who had heard of the Pap smear test ranged from 7% (Khadka et al. 2017) to 69% (Shrestha and Dhakal 2017). Some studies found that women had adequate CCS knowledge, for example that CCS is a way of preventing cancer by detecting cancers or abnormalities that could lead to cancer. The lowest level (11%) was found by Baral et al. (2020) in a study of 170 hospital outpatients and visitors from an urban area. A study of 96 gynaecological outpatients found that the only factor significantly associated with level of CCS knowledge was education (Shrestha and Dhakal 2017), which was confirmed in two other studies (Khadka et al. 2017; Thapa 2018).

Only one study reported on knowledge of visual inspection with acetic acid (VIA) for CCS. Sherpa et al. conducted a researcher-administered survey among 102 high school or secondary school teachers aged between 20 and 56 years, and around one in five (21%) had heard of VIA.

Few women had experience with CCS, with percentages of women who (ever) had CCS ranging from 2% (Shah et al. 2010) to 47% (Andersen et al. 2020). The most commonly reported reasons for not having CCS were lack of information about CC and screening and lack of symptoms or discomfort. Other reasons included illiteracy, lack of finance, shame or embarrassment, living in rural or low-income areas, concerns regarding side effects or that the procedure is painful, and fear that screening would result in positive results or a cancer diagnosis (Darj et al. 2019; Maharjan et al. 2020; Poudel and Sumi 2019; Ranjit et al. 2016; Satyal 2013; Sherpa 2007; Sherpa et al. 2020; Shrestha et al. 2013; Shrestha 2014; Shrestha 2017; Shrestha and Dhakal 2017;

Shrestha et al. 2020; Shrestha et al. 2021a; Thapa 2018; Thapa et al. 2018). Factors associated with higher uptake of CCS included older age, higher education, awareness about costs, knowledge of the availability of CCS services, urban residency, education programmes or a positive family history of cancer (Darj et al. 2019; Ghimire and Pathak 2020; Ranabhat et al. 2014; Thapa 2018; Thapa et al. 2018).

Eight studies reported on attitudes towards CCS (Baral et al. 2020; Ranabhat et al. 2014; Shah et al. 2010; Shakya et al. 2016; Shrestha et al. 2013; Shrestha 2014; Shrestha and Dhakal 2017; Thapa et al. 2018). Positive attitudes towards CCS among women ranged from 10% (Shrestha and Dhakal 2017) to 72% (Thapa et al. 2018). Factors associated with favourable attitudes identified by Baral et al. (2020) were ethnicity, employment and marital status. Shah et al. (2010) reported that positive attitudes towards CCS were related to higher knowledge of risk factors and screening modalities. Shrestha (2014) found that a positive attitude towards CCS was associated with a higher level of education and adequate knowledge of CCS. Only one study found that illiterate and married women had higher favourable attitudes towards CCS (Thapa et al. 2018). Shakya et al. (2016) showed that community-based health education had a positive influence on the attitude towards CCS among women in a rural area of Nepal. All participants were in favour of CCS, while before the educational session, only 16% were willing to have CCS, 59% were unsure, and 25% refused CCS because they believed they were not at risk for CC.

The qualitative studies in this review provided more in-depth insights into women's experiences and beliefs regarding CCS. Andersen et al. (2020) examined the barriers to and facilitators of CCS participation through focus groups and interviews with 44 women aged between 30 and 60 years. The main barriers were lack of permission from their husbands, fear of social exclusion and gossip, poverty and transportation costs. The main facilitators were autonomy of women with regard to making their own health-related decisions, public awareness campaigns to reduce stigma around CC and CCS, and screening being free of charge.

Sex and sexual health are sensitive topics in Nepali women, and many women will not have visited a gynaecologist or only for specific reasons, such as pregnancy (Menger et al. 2015). Avoiding CCS because of shame and embarrassment was stated by 17 CC survivors who had completed 2 years of treatment and participated in focus groups. None of the women ever had any type of CCS before they were diagnosed with CC, and some were reluctant to undergo treatment after their diagnosis or endured social stigma in the form of physical isolation and verbal abuse. However, because of their own experiences with CC, they realized the importance of screening methods for early detection and treatment.

A preference for female HCPs to perform the CCS and consultations was stated by women in the study by Andersen et al. (2020). Study participants also highlighted that trust and confidentiality, and skills and training were important to facilitate CCS uptake. Darj et al. (2019) reported similar findings in a series of focus groups with 72 gynaecology outpatients aged between 25 and 60 years. All women were married, as gynaecological examinations were not performed for unmarried women. They believed that HCP negligence or incompetence would cause their health to deteriorate and cause complications and they were hesitant about attending clinics.

Knowledge and attitudes towards human papillomavirus infection and vaccine The human papillomavirus (HPV) is a major cause of the main types of cervical cancer. Sixteen studies assessed women's knowledge of HPV infection or vaccine (Baral et al. 2020; Bhatta et al. 2020; Johnson et al. 2014; Joy et al. 2011; Khadka et al. 2017; Poudel and Sumi 2019; Rachana and Giri 2019; Shah et al. 2010; Shakya et al. 2016; Sherpa et al. 2020; Shrestha 2014; Shrestha and Dhakal 2017; Shrestha et al. 2020; Shrestha et al. 2021a; Thapa et al. 2018; Thapa 2018). The percentage of women who had heard of HPV ranged from 0% (Shakya et al. 2016) to 53% (Joy et al. 2011). Women who knew about the link between HPV infection and CC ranged from less than 1% (Sherpa et al. 2020) to 39% (Shrestha 2014).

Knowledge about the sexual transmission of HPV was mentioned in two studies. In a study by Khadka et al. (2017) among 600 women aged 15 to 49 years, only 5% had heard of HPV, but the majority (80%) knew that this infection is sexually transmitted. Joy et al. (2011) reported the findings of a self-administered survey among 480 female students and noted that 53% had heard of HPV, of whom 51% knew that the infection can be transmitted through (multiple) sexual partners, and 43% that condom use does not prevent transmission. Three other studies also cited multiple sexual partners as a common risk factor for CC (Khadka et al. 2017; Shakya et al. 2016; Thapa et al. 2018).

Only one study examined factors associated with HPV knowledge, and found that lower knowledge levels were associated with education level (illiteracy, informal education), type of occupation (unskilled jobs) and lower monthly household income (Khadka et al. 2017).

Ten studies reported on awareness of or attitudes towards the HPV vaccine (Baral et al. 2020; Bhatta et al. 2020; Johnson et al. 2014; Khadka et al. 2017; Poudel and Sumi 2019; Rachana and Giri 2019; Sherpa et al. 2020; Shrestha et al. 2021a; Thapa 2018; Thapa et al. 2018). Knowledge ranged from 3% (Khadka et al. 2017) to 14% (Bhatta et al. 2020), of which 10% (Baral et al. 2020) to 38% (Rachana and Giri 2019) of women knew that having the vaccine can prevent CC. Shrestha and Dhakal (2017) reported that 12%

mistakenly believed women who had the HPV vaccine did not need CCS. Two studies noted that although few women had heard of the HPV vaccine (up to 14%), the majority (over 90%) would vaccinate themselves or their children if the vaccination were provided at no cost (Bhatta et al. 2020; Khadka et al. 2017). Barriers to vaccine uptake were low awareness, financial concerns and concerns regarding side effects. Older age and higher income were associated with willingness to accept the HPV vaccine (Bhatta et al. 2020).

Discussion

BC and CC are the two most common cancers in women in Nepal. Not only do they result in significant morbidity and mortality, but in 2012 it was estimated that the total lost productivity in Nepal resulting from female cancers was $121 million (Roy Chowdhury and Bohara 2020). This is the first review on knowledge, attitudes and screening practices for BC and CC among women in Nepal. The study found that for both cancers, levels of knowledge including early warning signs, symptoms and risk factors were generally poor. Furthermore, screening practices were inadequate and often resulted from lack of knowledge about the disease or screening routines. Common reasons for lack of screening included a lack of belief in personal need for screening, fear of finding abnormalities and concerns regarding social stigma. Higher rates of screening were seen in women with higher education levels, higher knowledge levels of both cancers and participation in awareness campaigns. Positive attitudes towards CCS were associated with higher levels of education and more knowledge of CCS and risk factors for CC; however, few studies reported on attitudes towards BC and CC.

Our results regarding BC and CC screening behaviours align with findings from other studies. A meta-analysis conducted by Kassie et al. (2020) estimated that the uptake of CCS among women in Ethiopia was 8% and knowledge of CC was significantly associated with the utilisation of CCS. A review of the uptake of BC screening in low-resource countries found that utilisation of BC screening in Asian countries was 19% (Mahumud et al. 2020). Factors increasing uptake of BC screening were higher education levels, older age at first birth (i.e. 25 years or older), female-headed households, access to media communication and urban residency. Another systematic review found that screening practices for both cancers were increased in women with more opportunities for knowledge acquisition, such as higher education levels, urban residency and employment outside the home (Islam et al. 2017). This highlights the importance of ensuring that interventions to increase knowledge include women with fewer opportunities for knowledge acquisition.

Multiple articles have found similar barriers to screening as those highlighted in this scoping review. A study in Indonesia reported barriers to CCS including dislike of pelvic exams, discomfort of screening conducted by male HCPs, financial concerns, anxiety regarding abnormal results and the misconception that there is no need for screening when asymptomatic (Spagnoletti et al. 2019). Pierz et al. (2020) noted that in sub-Saharan Africa, barriers to CCS included lack of knowledge about BC and CC, lack of support from husbands, and the stigmatisation of the utilisation of CCS and BC screening services. Another systematic review evaluating the uptake of CCS in LMICs found barriers to be lack of knowledge/awareness, embarrassment and lack of familial support (Devarapalli et al. 2019). Islam et al. (2017) conducted a systematic review and concluded that key barriers to both BC and CC screening in LMICs were lack of knowledge of both cancers and a poor understanding of the role of screening. Taken together, these results suggest that poor knowledge and awareness of both cancers, stigmatisation from family and the community, lack of affordable healthcare and embarrassment of intimate examinations all contribute to poor BC and CC screening practices.

Our review found that, although knowledge of the HPV vaccine was low, on the whole, women had a positive attitude towards the HPV vaccine, which was also reported previously. A systematic review about attitudes towards the HPV vaccine in South-East Asia by Kristina et al. (2019) reported low knowledge levels of the vaccine; nevertheless, individuals were willing to receive it. Spagnoletti et al. (2019) found that although most participants had no knowledge of the HPV vaccine or the causal link between HPV and CC, most were still willing to vaccinate their children against HPV.

Future interventions for cervical cancer

The World Health Organization (WHO) have called for the elimination of CC by the end of the century (Gravitt et al. 2021; WHO 2020). The targets to achieve this include implementing HPV vaccination and increasing access to cervical screening and management interventions (Gravitt et al. 2021; WHO 2020, Gultekin et al. 2020). Although countries with a higher incidence of CC will likely take longer to achieve these goals, substantial gains can be made in the short term through implementation of recommended actions (Gultekin et al. 2020). A demand for screening and vaccines from the public through awareness campaigns are key in ensuring the WHO targets will be met. One way to do this is through education programmes, working on the premise that low knowledge and awareness are primary barriers to screening uptake. One of the studies in our review found that the number of women willing to participate in CCS rose from 16% to 100% following an educational meeting about

CC and CCS (Shakya et al. 2016). Moreover, the 122 study participants recruited an additional 222 peers for screening. This shows that community-based education programmes in Nepal can improve willingness for CCS and that women's social circles play a role in promoting CCS. Lott et al. (2020) reviewed interventions aimed to increase the uptake of CCS in sub-Saharan Africa. They concluded that educational interventions work better when peer health educators or community health workers (CHWs) are used, as educators are known to the participants.

O'Donovan et al. (2019) reviewed the literature surrounding the role of CHWs for CCS in LMICs, reporting that not only do CHWs play important roles in community-based education and CCS awareness, but they can also assist/conduct CCS and follow women up throughout the screening process. The first study investigating the effect of a community-based intervention by female community health volunteers (FCHVs) on CCS uptake among women in Nepal is currently underway, with last endpoint assessments for August 2021 (Shrestha et al. 2021b). CHWs play an important role in understanding, often nuanced, cultural barriers within communities; this study will therefore provide important insights into the potential roles that CHWs/FCHVs can have in future CCS programmes in Nepal. However, including CHWs in screening programmes for BC and CC does not come without challenges; some women reported that they did not want people they knew to conduct these intimate examinations; there are also reports of errors in data collected by CHWs, and concerns regarding the sustainability of these programmes, as high turnover of CHWs has been documented (O'Donovan et al. 2019, 2020).

In 2012, WHO launched a mobile health (mHealth) initiative to combat NCDs. Mobile phone applications and text messaging services are used to improve disease protection, management and control. mHealth could improve the control of CC in LMICs (Denny et al. 2017). Zhang et al. (2021) found through a systematic review that mHealth, especially telephone reminders/messages, lead to increased uptake of Pap smear tests. Further research, however, needs to be done to determine whether mHealth can be used to increase knowledge of CC. Future trials should look into the role of mHealth in increasing awareness and screening practices for BC and CC in Nepal.

Future interventions for breast cancer

WHO have created the Global Breast Cancer Initiative, with the primary goal of reducing global BC mortality through increased access to early diagnosis and prompt BC treatment (Anderson et al. 2021). In LMICs, women with BC often present at a later stage of disease, leading to increased rates of morbidity and mortality in comparison to HICs (Anderson et al. 2021). It is therefore important that women in LMICs are aware of BC and the importance of screening to reduce the number of women presenting with late-stage BC. Mammography is a non-invasive screening method for BC, and there is evidence that it reduces mortality if women aged 50–69 are screened every 2 years (Siu 2016). Mammography, however, is expensive and therefore not recommended by WHO for populations in LMICs (Ngan et al. 2020; WHO 2014). BSE and CBE are low-cost BC screening alternatives in these countries (WHO 2014). An education programme with schoolgirls in Nepal increased mean BSE knowledge scores from 33% to 85% (Sapkota et al. 2016). It is important, however, that increases seen in knowledge levels translate to increased BSE practices.

CHWs can play a number of important roles in early BC detection initiatives in LMICs (Hand et al. 2021). These roles include raising awareness, taking histories, performing CBE, making referrals and following up patients (O'Donovan et al. 2020). A systematic review published in 2020 looking at CBE in LMICs found no reduction in breast cancer mortality with CBE compared to no screening (Ngan et al. 2020). Conversely, Mittra et al. (2021) conducted a large study on the benefits of CBE with 151,538 women in Mumbai, India over 20 years. Women in the screening arm ($n = 75{,}630$) had CBE conducted by trained female primary healthcare workers every 2 years. Not only was BC detected at an earlier stage in the screening group than in the control, but there was a significant reduction of nearly 30% in mortality in women aged 50 years or older. It was concluded that CBE should be considered in LMICs as a method of screening for BC. It would therefore be beneficial for future research to be conducted on the use of CBE as a screening method in Nepal.

Strengths and limitations

The key strengths of this review are that it is the first of its kind, it focused on the two most common cancers in women in Nepal, and included large numbers of women and recently published studies, as 24% were published very recently (2020, 2021). Women were included from a wide range of ages and backgrounds, and from both rural and urban areas. A final strength of this review is that it included both quantitative and qualitative studies. Three recently published qualitative articles provide important insights into reasons for low CC awareness, ultimately informing target areas for future interventions.

Several limitations need to be acknowledged. Firstly, as this was a scoping review with the aim of identifying gaps in knowledge, articles included were not appraised. Additionally, eight of the included studies used a convenience sampling technique, and thus it is unknown whether there is any bias as a result. Another eight studies sampled women from hospital settings, including gynaecological in- and

outpatient units. These women have access to healthcare and may, therefore, be more health-literate. Another limitation is that this review focused on articles in English, so it is possible that reports in Nepali could have been overlooked. Finally, the majority of studies in this review focused on CC; future research should be conducted on knowledge, attitudes and screening practices for BC.

Conclusion

This study has shown that levels of knowledge and screening practices for BC and CC are low among women in Nepal. This results from socio-cultural, geographical and financial barriers. Screening practices were higher in women with better knowledge and awareness. It was also shown that attitudes towards BC and CC screening and towards the HPV vaccine were generally positive, especially in women with high levels of knowledge or after educational interventions. This is promising for future screening programmes in Nepal. Reducing the burden of BC and CC in Nepal will require earlier detection of both cancers through accessible screening programmes. Implementation of the HPV vaccine in line with the WHO targets will further help by reducing the incidence of CC. Finally, widespread financial and geographical barriers to accessing healthcare in Nepal must be addressed. Women need more than just knowledge about cancer; they need access to treatment. Future studies should focus on knowledge, attitudes and screening practices regarding BC and the use of CHWs for BC in Nepal, and explore the use of mHealth to increase cancer awareness among the public.

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Declarations

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